

Wind Energy: a viable alternative energy source for Virginia



**Virginia Energy Plan Working Group
Williamsburg – November 2, 2006**

Wind Energy is increasingly Mainstream

- **Globally:** 60,000 MW installed; 15,000 MW to be added in 2006; 70% of this capacity installed in Europe; Germany 23% penetration level (based upon capacity); Spain 24% penetration level
- **US:** 10,000 MW installed; 3000 MW to be added in 2006; CA 5.1% penetration level; TX 3.3% penetration level
- **East Coast:** 650 MW operational in ME, NJ, NY, PA, TN, VT and WV by end of 2006; more than doubled over last 18 months; more than 7500 MW under development

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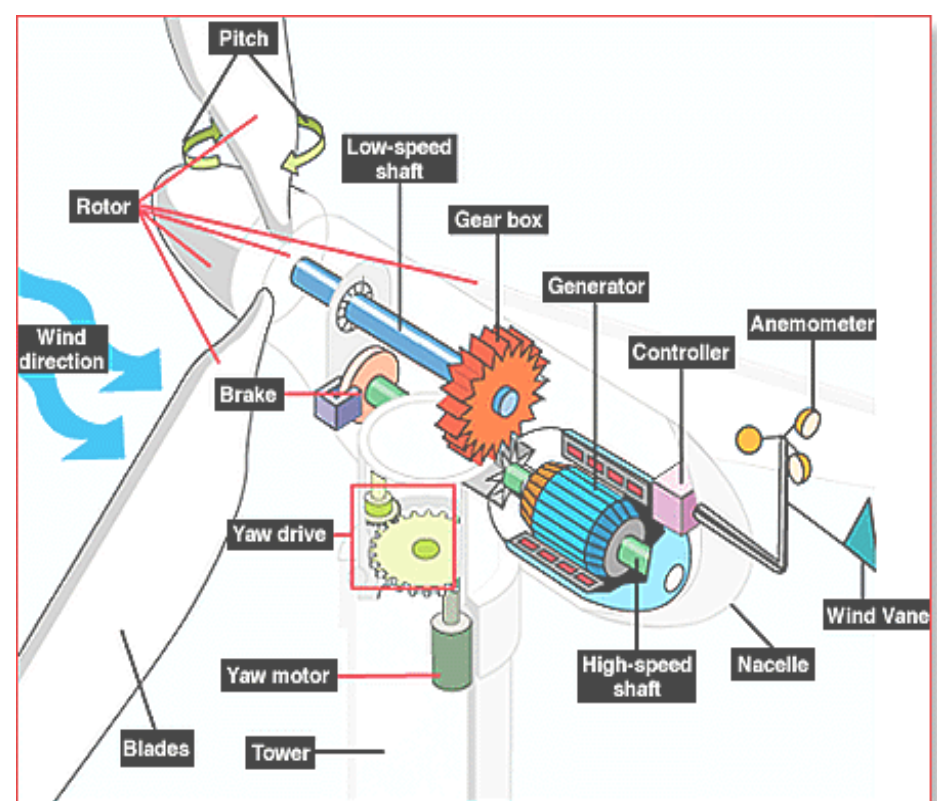
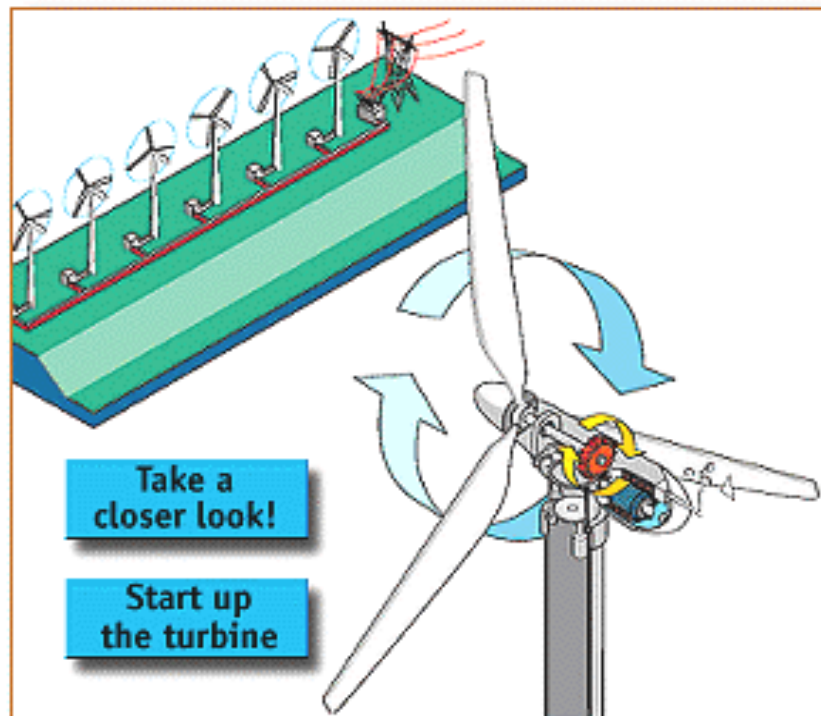
- Electric Industry Trends are favorable:
 - Long term cost trends for wind vs. the competition
 - Growing environmental constraints for fossils
 - Utility interest in portfolio diversity
 - Energy Independence
- No longer “alternative” but a standard utility technology
- Consolidation in wind energy industry:
 - GE and Siemens have acquired smaller wind turbine manufacturers and are now the leading suppliers
 - Development is getting dominated by large corporations: two VA-based developers were acquired in last 18 months; Richmond-based Atlantic Renewable by Scottish Power; Charlottesville-based Greenlight by BP

Why Wind?

- Cost Competitive
- Fuel Diversification
- Price Stability
- Clean / Environmental
- Local energy source
- Energy independence
- Rural Economic Development



Modern Wind Project / Turbine



Size of Wind Turbines

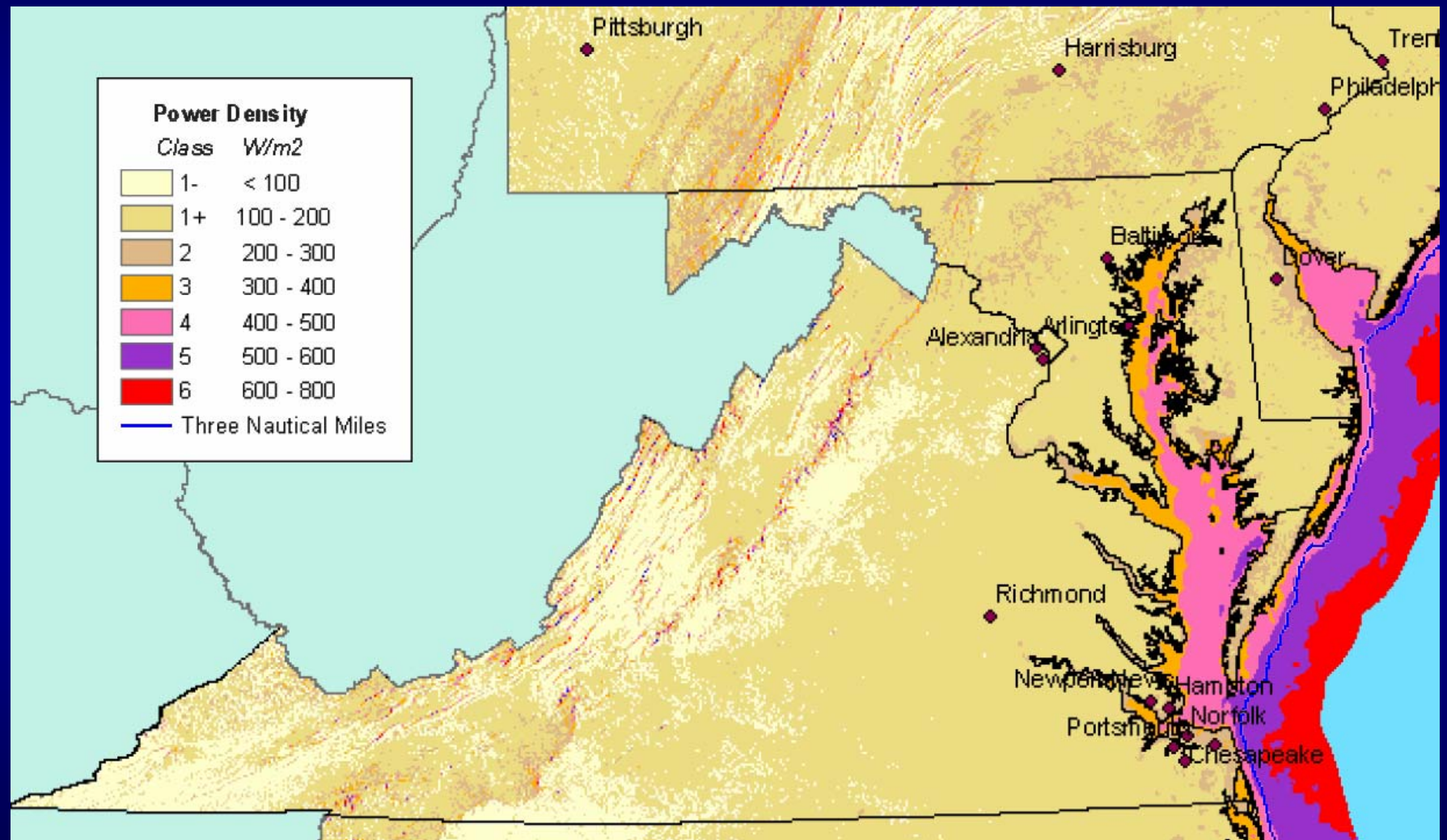
- Nameplate capacity 600 – 5000 kW
- Turbine Footprint is small: tower diameter 14 ft.
- Rotors on larger machines bigger than Boeing 747 (265 ft)
- Lowest ground clearance is > 100 ft.



Onshore Wind Power Potential in Virginia

- Onshore Wind Resource within Virginia is driven by:
 - Elevation: focus on areas higher than 2000 ft - resulting in many potential wind project sites on mountain ridges in western VA
 - Coastal: focus on Eastern shore
- Permitting and land use constraints eliminate lots of potential sites or make for small projects
 - Visual impact
 - Avian and wildlife impact
 - Noise impact (set back requirement of at least 1000 ft)
 - Wetlands and sedimentation impact
 - Miscellaneous (National and State Parks, Mining, etc.)
- Grid-interconnection and general infrastructure are a critical (and often lacking) variable at potential project sites
- VA onshore windpower potential estimated to be > 2000 MW
- Only One 40 MW project in Highland County under active development

Virginia Wind Resource Map



Offshore Wind Power Potential in Virginia

- Limitations on on-shore wind power site potential may result in the development of off-shore wind power
- Off-shore Wind Energy has been proven to be technically and commercially feasible in Europe where > 750 MW is in operation
- VA has great offshore potential from resource, water-depth, interconnection and other required infrastructure perspective



State Policy Support for Renewables

- Lack of VA wind power development partly due to minimal state policy support
- Wind power development in other East Coast states is driven by state RPS regulations and other support measures
- Requirement for fair siting regulations: Landscape Classification System analysis performed for renewable energy sources within VA.





Questions & Discussion